

surroundings and conditions as the island was raised to its present altitude.

There is need for much study on the distribution and evolutionary history of the Cuban land shells, and perhaps right here will be found the answers to some Cuban geological problems that fairly call aloud to the traveler. There is evidence, for instance, that Cuba was not very long ago divided and separated into several islands—a large east and a large west one—with several smaller islands lying between and projecting high above a shallow sea. Almost beyond question there has been a considerable exchange of species between Florida and that portion of Cuba lying directly south of Florida. This may be accounted for most plausibly by the migrating water fowl which divide their seasons between the great swamps of this portion of Cuba, the Everglades in Florida and the more northern waters of the United States.

If the editors of the NAUTILUS can afford me space later on I would like to give accounts of some of our personal experiences in the field, particularly about the southern edge of the great Zapata swamp, at Vignales in the Organ Mountains of Pinar del Rio, and finally of our race to catch those two most astonishing shells, *Urocoptis elliotti* and *U. dautzenbergiana*, which live only upon the lofty cliffs of two isolated mountains near Guane.

NEW MICHIGAN LYMNÆAS.

BY BRYANT WALKER.

A careful review of the *Lymnæas* of Michigan, incident to the preparation of Part II of the Michigan Catalogue, has increased the number of species represented in the state fauna from 18 as recorded in 1894 (Rev. Mich. Moll., p. 11), to 28 at the present time.

In the material examined, the following forms occurred, which seem worthy of specific or varietal recognition :

Lymnæa pilsbryana n. sp., Pl. I, figs. 2, 8–11.

Shell ovate-conic, slightly perforate; dark brownish-yellow, frequently tinged with purple, with a light line just below the suture; whorls 5, convex, with a deeply impressed suture, the three apical whorls small, forming a short conical apex, penultimate whorl twice

as long as the three preceding, inflated and convex, body-whorl large and well rounded; lines of growth strong and regular, cut by numerous fine spiral lines giving a shagreened appearance to the surface, in some specimens the last half of the body whorl is obsoletely mal-leated; aperture broadly oval, somewhat more than one-half of the entire length of the shell, dark brownish-yellow within, with a liver colored band just within the lip; lip sharp, regularly rounded and slightly expanded toward the basal margin; columella thick, white with a strong fold, broadly reflected over and appressed to the axial region, leaving only a very small perforation, and connected with the upper insertion of the lip by a broad white and rather thick (for the genus) callus; axis thick, solid, twisted.

Alt. (Fig. 8) 22; diam. $13\frac{1}{2}$; length of ap. 13; width 10 mm.

Alt. (Fig. 11) 24; diam. 14; length of ap. 14; width 10 mm.

Type (No. 21345, coll. Walker) from Washington Harbor, Isle Royale, Lake Superior, Mich. Cotypes in the collection of the Philadelphia Academy and Chicago Academy of Sciences.

Immature specimens of this species were first taken by the University of Michigan expedition of 1904, and in the report of that trip (Rep. Geol. Surv. Mich., 1905, Separate, p. 97) was stated to be "related to *L. sumassi* Bd., but probably undescribed."

The expedition of 1905 was fortunate in securing fully-matured specimens. And a comparison of these with a photograph of cotypes of *sumassi* from the British Museum, kindly furnished by Mr. F. C. Baker, of Chicago, showed that the two forms were entirely dissimilar.

The affinities of *pilsbryana* are entirely with *L. emarginata* Say, a species of general distribution through the Great Lakes from Saginaw Bay northward.

It differs from that species in its darker color, more inflated whorls, especially those of the spire, and the entire absence of the emargination characteristic of that species.

L. emarginata was also found on Isle Royale, and there maintained the acute conical spire with a less impressed suture characteristic of the usual form of that species. The axis of the Isle Royale *emarginata* (fig. 1) is more slender, more curved and less twisted than that of *pilsbryana* (fig. 2). Both of these figures are made from immature specimens.

Lymnæa petoskeyensis n. sp., Pl. I, fig. 3, 5-7.

Shell elongate oval, acutely conic, perforate; thin, pale horn-color, almost white, translucent; whorls 6, regularly increasing, convex, with a well impressed suture; spire elongated, acutely conical, apical whorl minute; body whorl somewhat inflated, elongate oval; lines of growth fine and regular, cut by numerous very fine revolving, spiral lines, surface more or less malleated; aperture oval, subangulate above and rounded below, slightly more than one-half the entire length of the shell; lip thin and sharp; columella nearly straight without any fold, inner lip expanded and reflected over the round deep umbilicus and continued as a thick white callus over the parietal wall; where this callus passes over the umbilicus toward the basal margin it is abruptly depressed into the umbilical opening, forming a well marked furrow between the columella and the parietal wall, and giving the appearance of a twist to the face of the columellar enlargement, but the columella itself is scarcely affected by it; the axis is large for the size of the shell, without any trace of a fold, and nearly cylindrical, the base of the preceding whorl abruptly flattened around the insertion of the upper end of the pillar.

Alt. (Fig. 5) 23.5, diam. 11.25, ap. length 13, width 8 mm.

Alt. (Fig. 6) 24.5, diam. 11, ap. length 13.5, width 7.5 mm.

Alt. (Fig. 7) 25, diam. 10.5, ap. length 12, width 7 mm.

Types (No. 14347 coll. Walker) from a small spring-brook flowing into Little Traverse Bay, near Petoskey, Mich. Cotypes in the collections of the Philadelphia Academy and the Chicago Academy of Sciences.

This species was at first supposed to be a very thin, fragile form of the elongate variety of *L. catascopium*, characteristic of the lake region. But upon cutting into the shell, the peculiar shape of the axis forbade its reference to that species.

Under Dr. Dall's arrangement of *Lymnæa* (Harr. Exp. XIII, p. 64) it would belong to the section *Galba*. Compared with *L. desidiosa* Say, (Fig. 4) the axis of *petoskeyensis* (Fig. 3) is proportionately much larger, more elongated and more cylindrical, but the general features of both are the same. The peculiar contraction of the base of the whorl around the upper end of the pillar, so remarkably developed in *petoskeyensis*, is present, but not at all marked, in *desidiosa*. The umbilicus in *petoskeyensis* is round and deep, and is more conspicuous in the immature shells, as the expansion of the broadly reflected columella nearly covers it in the adult.



